Metrical prodosy: A template-and-constraint approach to phonological phrasing in Italian. Based on the poetry of Giuseppe Ungaretti and Eugenio Montale
Helsloot, C.J.

Citation for published version (APA):

General rights
It is not permitted to download or to forward/distribute the text or part of it without the consent of the author(s) and/or copyright holder(s), other than for strictly personal, individual use, unless the work is under an open content license (like Creative Commons).

Disclaimer/Complaints regulations
If you believe that digital publication of certain material infringes any of your rights or (privacy) interests, please let the Library know, stating your reasons. In case of a legitimate complaint, the Library will make the material inaccessible and/or remove it from the website. Please Ask the Library: http://uba.uva.nl/en/contact, or a letter to: Library of the University of Amsterdam, Secretariat, Singel 425, 1012 WP Amsterdam, The Netherlands. You will be contacted as soon as possible.
2.0 Introduction

This chapter discusses the theoretical frameworks which form the basis for the analysis of the poetry of Ungaretti and Montale. The frameworks in question are: prosodic phonology, metrical phonology and the theories of poetic meter. Special attention will be devoted to the prosodic level of the phonological phrase, the principles of eurhythmic organization, and the versification principles involving syllable-count. Crucial claims and notions, as well as drawbacks and shortcomings related to the above theories will be discussed in this chapter. The chapter is organized as follows. Section 2.1 deals with the theory of prosodic phonology as advanced by Nespor & Vogel (1986). I shall focus on the phonological phrase formation algorithms as well as on the arguments on the basis of which these algorithms are defined. I shall present some new data regarding the domain-bound application of external sandhi phenomena in Italian. Section 2.2 provides an outline of metrical phonology. Where prosodic phonology was initially concerned with the application of segmental processes, and metrical phonology with issues related to stress, it becomes more and more clear that metrical constituency captures both stress properties and application of segmental processes (cf. Hammond 1984, McCarthy & Prince 1986, Halle & Vergnaud 1987, Hayes 1987, 1995, Kager 1989, 1995a, Booij 1995). Evidence will be provided with respect to word-level constituency. With respect to phrase-level constituency, however, the integration of both theories still needs to be addressed. I shall discuss some contradictory notions between the two theories. In section 2.2, I shall also address the phonetic correlates of word stress and phrase stress, as well as the phonetic correlates of constituent boundaries in Italian. Section 2.3 introduces some traditional principles of Italian versification. I adopt these principles in order to distinguish one meter from the other. In line with Generative Metrics (cf. Halle & Keyser 1971, 1980, Kiparsky 1975, 1977, Nespor & Vogel 1986, Hayes 1989a), I assume that lines of verse can be characterized by rhythmically well-formed patterns. I formalize these patterns by means of metrical grid representations. Properties like repetition and concrete timing
will be discussed in order to demarcate poetic language from non-poetic language. Section 2.4, outlines the research method.

2.1 Prosodic Phonology

Prosodic phonology has the following two objectives: (a) to provide a structural account of how strings of segments are grouped into larger prosodic constituents, and (b) to provide an account of the application domains of segmental and suprasegmental phonological processes (cf. Selkirk 1972, 1978, 1980, 1986, Nespor & Vogel 1982, 1986, Hayes 1989a, Kaisse 1985, 1987, 1990, Selkirk & Shen 1990, Zec & Inkelas 1990, Inkelas & Zec 1995). Although the various theoretical proposals about prosodic phonology diverge quite notably from each other, they tend to agree about the prosodic constituents as well as their hierarchical ordering given in (1). In the present work, I adopt this version of the prosodic hierarchy.

(1) Prosodic Hierarchy

phonological utterance (U)
   \[ \text{intonation phrase (I)} \]
   \[ \text{phonological phrase (q)} \]
   \[ \text{prosodic word (w)} \]
   \[ \text{foot ($s$)} \]
   \[ \text{syllable ($o$)} \]

The prosodic hierarchy is held to be constrained by the Strict Layer Hypothesis (Selkirk 1984a, Nespor & Vogel 1986). The Strict Layer Hypothesis (SLH) consists of two fundamental principles:

(2) Strict Layer Hypothesis (Nespor & Vogel 1986:7)

Principle 1. A given nonterminal unit of the prosodic hierarchy, XP, is composed of one or more units of the immediately lower category, XP⁺¹.

Principle 2. A unit of a given level of the hierarchy is exhaustively contained in the superordinate unit of which it is part.²

---

1 Well-known theories on phrasal phonology are the C-command Theory (cf. Kaisse 1985), the End-based Theory (cf. Selkirk 1978, 1980, 1986, Selkirk & Shen 1990), the Relation-based Theory (cf. Nespor & Vogel 1982, 1986, Hayes 1989a), and the Arboreal Theory (Zec & Inkelas 1990, Inkelas & Zec 1995). I refer to The Phonology-Syntax Connection (1990), edited by Sharon Inkelas and Draga Zec, for ample discussions and illustrations of these theories. The reason why I adopt the relation-based approach for an analysis of the verse data is rather trivial: my phonological education started with this theory.

2 This principle is accepted by most phonologists in a slightly weaker form: in edge position, a unit at level XP may skip the immediately superordinate level XP⁺¹, such that it will be contained in the unit at
More concretely, Principle 1 ensures that e.g. a prosodic word is composed of one or more feet, and Principle 2 that a prosodic word is exhaustively contained in a phonological phrase. Nespor & Vogel (1986:7) additionally assume the validity of two other principles:

(3) **Principle 3.** The hierarchical structures of prosodic phonology are n-ary branching.

(4) **Principle 4.** The relative prominence relation defined for sister nodes is such that one node is assigned the value strong (s) and all other nodes are assigned the value weak (w).

Principle 3 implies, for instance, that a phonological phrase may contain one prosodic word, but also, in principle at least, seven or thirty prosodic words. Principle 4 determines, for instance, that in a phonological phrase containing seven prosodic words, one prosodic word is strong while the remaining six are weak.

Universal as well as language-specific conditions have been argued to be responsible for the assignment of the strong-weak pattern. In what follows, the four principles will be illustrated with respect to the phonological phrase in Italian.

### 2.1.1 The Phonological Phrase

All current theories of prosodic phonology (see references above as well as footnote 1) define the phonological phrase as a domain whose head and/or edges are determined by the syntactic surface structure. This syntax-based approach to phonological phrase constituency will be initially adopted in chapter 3 in order to provide a first analysis of the verse data. The syntax-to-prosody mapping algorithm formulated by Nespor & Vogel (1986:168) is chosen as a working hypothesis. In (4), I present this algorithm in terms of lexical heads and maximal projections only, i.e. no reference is made to the level of the Clitic Group.³

---

³ The Weak Layering Hypothesis often refers to word-edge syllables which remain unfooted but are dominated by a prosodic word (cf. Hayes 1989, Ino & Mester 1992).

³ The original definition is as follows:

*Phonological Phrase Formation: the Φ domain* (Nespor & Vogel, 1986:168)

The domain of Φ consists of a C [clitic group] which contains a lexical head (X) and all Cs on its nonrecursive side up to the C that contains another head outside of the maximal projection of X.

The existence of the clitic group as an intermediate constituent between the prosodic word and the phonological phrase is a controversial issue. There are two reasons why I preclude here the clitic group as separate level: (a) the clitic group has no rhythmic properties of its own, i.e. there is no evidence that the clitic group has a stress prominence with a measurable quantity which differs from prosodic word prominence on the one hand, and phonological phrase prominence on the other, and (b) phonological phenomena which are argued to provide positive evidence in favor of the clitic group, allow also for an analysis in terms of prosodic words and/or phonological phrases (cf. Booij 1983, 1988, 1995, Zwicky 1984, Zec 1988, Malkouni-Drachman & Drachman 1992).
CHAPTER 2

(4) **Phonological Phrase Formation: the \( \Phi \) domain**

The domain of \( \Phi \) contains a lexical head (X) and all non-lexical and/or lexical elements (Y) on its nonrecursive side up to a lexical head (Z) that falls outside the maximal projection of X.

*\( \Phi \) relative prominence* (Nespor & Vogel 1986:168)

In languages whose syntactic trees are right branching, the rightmost node of \( \Phi \) is labeled s (strong); in languages whose syntactic trees are left branching, the leftmost node of \( \Phi \) is labeled s. All sister nodes of s are labeled w (weak).

Thus, the head syllable of the phonological phrase is the main stressed syllable of the word that constitutes the terminal element of a lexical maximal projection. Since Italian is considered to be a language whose syntactic trees are right branching, i.e., the unmarked position for complements in Italian is to the right of the head (cf. Graffi 1980), the rightmost prosodic word is the head of a \( \Phi \) and carries the head syllable of the \( \Phi \). The examples in (5) illustrate this syntax-to-prosody mapping: (i) shows the relevant syntactic parsing, and (ii) the prosodic one. In (i), square brackets and parentheses refer to lexical heads and maximal projections, respectively. In (ii), boldfaced nuclei are heads of \( \Phi \)'s, and parentheses mark off \( \Phi \) domains.

(5) ai. \( [(Tutto)N]\)NP ho \( [(perduto)V]\)VP dell'\( [\text{infanzia}]N\)NP

   everything have-lsg lost-PART of-the infancy
   'I lost everything of infancy'

   U201:14

   

   aii. \( [(Tutto)\Phi] \) (ho perduto)\( \Phi \) dell'\( \text{infanzia} \)\( \Phi \)

   everything have-lsg lost-PART of-the infancy
   'I lost everything of infancy'

   M101:10

   

   bi. \( \text{ed} \) \( [(ecco)A]\)AP che in un \( [(\text{attimo})N]\)NP

   and look how in a moment
   'and instantly'

   

   bii. \( \text{ed } \) (ecco)\( \Phi \) (che in un attimo)\( \Phi \)

   and look how in a moment
   'and instantly'

Comparing the syntactic parsing with the prosodic one, we observe that the left edge of the lexical maximal projection often does not coincide with the left edge of the phonological phrase domain. That is, one and the same phonological phrase may include terminal elements that are heads of different maximal projections. In (5b), for example, the complementizer \( \text{che} \) 'that/how' prosodically belongs to the phrase in un attimo, syntactically, however, it forms the (non-lexical) head of its own maximal projection, the Complementizer Phrase. The same holds for prepositional phrases (as for all functional projections): syntactically, the preposition is the head of the PP, but phonologically it is dependent on the head of the phonological phrase. Generalizing, lexical heads (i.e. Nouns, Verbs, Adjectives or Adverbs) of maximal projections may constitute heads of phonological phrases, whereas functional heads may not.\(^4\) This non-isomorphism between syntactic structure and

---

\(^4\) The capitals U and M, following lines of verse, refer to Ungaretti and Montale, respectively; the number left to the colon refers to the page number of the consulted edition (see Appendix A), and the number right to the colon to the actual line of the poem.

\(^5\) In other words, a phonological phrase definition based on a distinction between (overtly realized) lexical heads on the one hand, and (overtly realized) functional heads on the other, seems very attractive.
prosodic structure lies at the very root of the introduction of an independent
prosodic hierarchy with its own constituents. Obviously, only phonological
evidence can motivate a parsing in which two relatively unrelated syntactic elements,
like the complementizer *the* and the adverbial adjunct *in un attimo*, are combined into
a single prosodic constituent. Degrees of relative prominence as well as
phonological processes of segmental change provide the necessary information to
enable this.

With respect to degrees of prominence, lexical heads in Italian, as in many
languages, are typically characterized by main word stress, while functional heads like
complementizers, auxiliaries, prepositions and pronouns are typically characterized
by either lack of stress or secondary stress. Consequently, bearers of phrasal stress
are typically lexical heads and not functional heads. Up to this point prosodic
parsing seems extremely simple and straightforward. Things become more complex,
however, when two lexical heads are adjacent to each other. The question is how to
determine whether two adjacent lexical heads will be parsed into one phonological
phrase or two phonological phrases. Nespor & Vogel (1986) claim that two lexical
heads form a single phonological phrase if they are related to one another by a
specific syntactic structure: lexical heads occurring on the specifier side (i.e. on the
nonrecursive side) of the head of a maximal projection form a single phonological
phrase with the head. Consider again the φ definition given in (4). The sentences in
(6) exemplify this syntax-to-prosody mapping approach. As before, only the relevant
syntactic information is indicated.

\[
\begin{align*}
\text{(6) a.} \quad & \text{(ogni)A (forza)N}NP \quad \text{(decisa)A}AP \quad \text{(già)A (diverte)V}VP \\
\text{(ogni forza)φ (decisa)φ (già diverte)φ} \\
\text{every power decided already diverts} \\
\text{all resolve is diverted} \\
\text{bi.} \quad & \text{(egià)A gli [bate]V}VP \quad \text{ai ([polsi]N)NP} \quad \text{una ([volontà]N)NP} \quad \text{(cieca)A}AP. \\
\text{(e già gli bate)φ (ai polsi)φ (una volontà)φ (cieca)φ} \\
\text{and already to-him pulsates at-the wrists a will blind} \\
\text{a blind will throbbing at his pulse} \\
\end{align*}
\]

The X-bar schema in (7) represents the situation for Italian: all specifiers (including
modifiers) to the left of the head \(X_j\), belong to the same \(φ\) as \(X_j\); complements of
\(X_j\), occurring to its right, form \(φ\)'s on their own.

---

a phonological phrase contains a lexical head plus all functional heads on its left (for Italian). This
radical simplification has an important drawback, however: phonological phrases may also contain more
than one lexical head.
(7) The X-bar schema

\[
\text{XP}_j \quad \text{XP}_i \quad \text{XP}_g \quad \ldots \quad \text{XP}_m \\
\text{(specifiers)} \quad \text{(complements)}
\]

(8) is a tree representation of (6ai):

\[
\text{NP} \quad \text{AP} \quad \text{N} \quad \text{V} \quad \text{VP}
\]

The phonological phenomenon on the basis of which Nespor & Vogel (1986) formulated their definition of the phonological phrase, is the Standard Italian consonant-doubling phenomenon Raddoppiamento Sintattico (RS).\(^7\) RS refers to the lengthening of a word-initial simple consonant. This lengthening is said to take place when the preceding word is stress-final and occurs in the same φ domain as the target word.\(^8\) Across a φ-boundary, RS is argued to be blocked (cf. Nespor & Vogel 1986:167-8). Consider some examples from Nespor & Vogel:

(9) application of RS

a. \(\text{(#gia} \ [k:j]\text{aduta})\φ\quad (\text{caduta})\φ\quad \text{Modifier-Head} \> \text{caduta} \> \text{caduta} \\
\text{already fallen}'

b. \(\text{(#avra tirrovato})\φ\quad (\text{trovato})\φ\quad \text{Specifier-Head} \> \text{trovato} \> \text{tirrovato} \> \text{tirrovato} \\
\text{'(he) must have found'}

---


\(^7\) Nespor & Vogel (1986:168): "The mapping rules that define the domain of φ are based [ ... ] on the assumption that the domain of φ is equal to the domain of Raddoppiamento Sintattico."

\(^8\) This variant of Raddoppiamento Sintattico is generally referred to as Rhythmic RS. The other variant, i.e., Morphological RS, has nothing to do with stress. See for instance Marotta (1986) and Agostinlaia (1992) regarding this distinction. It should be noted that Nespor & Vogel refer to the rhythmic variant only, although their examples contain also instances of the morphological variant.
THEORETICAL BACKGROUND

Since Raddoppiamento Sintattico may also apply between certain head-complement sequences, Nespor & Vogel (1986) hypothesize the existence of a restructured \( \phi \) domain. Restructuring is claimed to be optional, however.

\[ \text{(11)} \quad \phi \text{ restructuring (optional)} \quad (\text{Nespor \& Vogel 1986:173}) \]

A nonbranching \( \phi \) which is the first complement of \( X \) on its recursive side is joined into the \( \phi \) that contains \( X \).

Thus, the head-complement sequence \( \text{una volontà cieca} \) (cf. (6b)) may form a single \( \phi \):

\[ \text{(12a)} \quad \text{(Mangiò)} \phi (tutto) \phi \quad \text{'} \rightarrow \text{ restructuring } \rightarrow \text{ (Mangiò [t]utto) } \phi \]

In the next section, I shall present data which argue against this branchingness restriction. First let me consider the optionality clause adjoined to the \( \phi \)-restructuring algorithm. Nespor & Vogel (1986:174) suggest that application of \( \phi \)-restructuring is dependent on the rate of speech and on the length of the involved domains: in fast speech one tends to restructure more than in slow speech, and short domains are more easily restructured than long domains.\(^{10}\) Since the authors do not present criteria which would allow one to establish whether the conditions for restructuring are met or not, the verse data will be analyzed on the basis of both parsing modes. That is, both non-restructured and restructured \( \phi \)'s will be assigned.

In what follows, I shall address the shortcomings of the just outlined relation-based approach to prosodic phrasing. In addition to RS, I shall discuss three other

---

\(^9\) Nespor & Vogel (1986:172) refer to Marotta (1986) as source of evidence in favor of the distinction branching vs. nonbranching complement with respect to Raddoppiamento Sintattico. However, what Marotta's measurements show is that the size of the interstress interval is determinantal, irrespective to whether the first complement is syntactically branching or not. Raddoppiamento Sintattico is simply absent when the final stressed syllable of the head is followed by two unstressed syllables.

\(^{10}\) In other words, \( \phi \)-restructuring is not an optional process: it either applies or not. Although not without difficulties, the triggers can certainly be defined.
phonological phenomena that are argued to be φ-bounded in Italian, namely, Stress Retracement, Troncamento and Final Lengthening.\textsuperscript{11}

\subsection*{2.1.2 Segmental Processes and Phonological Phrasing}

As mentioned earlier, Nespor & Vogel's φ-formation algorithms are based on the phenomenon of Raddoppiamento Sintattico: if RS applies, then the involved words belong to the same phonological phrase. Subsequently, the relationship between the words is expressed in terms of syntactic structure, c.q. the algorithms in (4) and (11).\textsuperscript{12} Before critically reviewing the RS data reported by Nespor & Vogel, I would like to briefly consider the role of segmental processes in determining prosodic constituency.

The question is whether it is theoretically legitimate to attribute to segmental processes alone the function of detecting prosodic constituency. In fact, these processes are observed in specific segmental contexts. If these contextual conditions are not met, the processes do not apply. Nevertheless, all input sequences will be prosodically parsed at surface. That is, the prosodic constituents within which segmental processes are bound to apply, must be defined in terms of intrinsic or context-free properties. Once prosodic constituents are independently defined, their role as application domain for segmental processes can be established, and, \textit{vice versa}, segmental processes may be analyzed as providing evidence in favor of prosodic constituency. Phonetic correlates of headship and boundaryship constitute segmentally context-free properties of prosodic constituents. That is, duration, pitch and loudness are crucially involved in the determination of prosodic heads and constituent boundaries (cf. Clark & Yallop 1990/1995). In section 2.2, I shall deal with the phonetic properties of phrasal prosodic constituency in Italian. First let me consider the classical external sandhi phenomena of Italian.

\subsubsection*{2.1.2.1 Raddoppiamento Sintattico and Phonological Phrasing}

Raddoppiamento Sintattico is not only a much described phenomenon in the phonological literature of Italian, but also a highly controversial one. I mention just a few recently published discussions on this issue: Napoli & Nespor (1979), Korzen (1980, 1986), Bertinetto (1985), Chierchia (1986), Hurch (1986), Marotta (1986), Bertinetto & Loporcaro (1988), Agostiniani (1992), Bolognesi (1992), Vayra (1992) and Ghini (1993). Subject to debate are the inter- and intraregional varieties of the phenomenon, the earlier mentioned distinction between morphological RS and

\textsuperscript{11} Except for Troncamento, which is analyzed in Nespor (1990a), the other phenomena are also treated in Nespor & Vogel (1986).

\textsuperscript{12} Empirical evidence in favor of these algorithms derives again from RS. In other words, Nespor & Vogel define the φ on the basis of application of RS, and application of RS is accounted for by means of the φ algorithms. In short, a rather circular argumentation.
Theoretical Backgrounds

The rhythmic RS (cf. footnote 8), the underlying representation of words that trigger RS, and the sensitivity of RS to syntactic structure. For the present, I will confine the discussion to the latter subject of debate, i.e., to the sensitivity of RS to syntactic structure. It should be noted that only the rhythmic variant of RS is at issue here.

As mentioned in the previous section, Nespor & Vogel (1986) claim that RS is highly sensitive to syntactic structure: RS applies between a specifier and its head, between a modifier and its head, and between a head and its first non-branching complement. This claim has been severely contested, however, by a number of linguists. Bertinetto (1985), Hurch (1986) and Agostiniani (1992) state explicitly that Raddoppiamento Sintattico is not sensitive to syntactic structure. For instance, RS can be observed in subject-verb sequences (cf. 13ab), as well as in verb-subject sequences (cf. 13cd):

(13)

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a</td>
<td>Artù [vj]iene</td>
</tr>
<tr>
<td>b</td>
<td>La città [kJ]adde 14</td>
</tr>
<tr>
<td>c</td>
<td>Cosa fa [d]ino?</td>
</tr>
<tr>
<td>d</td>
<td>Glielo dà [kJ]arlo il libro 15</td>
</tr>
</tbody>
</table>

'Artù is coming'  
'The city fell'  
'What is Dino doing?'  
'Carlo is giving him the book'

According to Nespor & Vogel's ϕ-formation algorithms, however, these subject-verb or verb-subject sequences could never be parsed into one and the same ϕ. In fact, (a) both the subject and the verb are realized by lexical heads, and (b) the subject and verb are neither in a modifier-head nor in a head-complement relation. Other syntactic configurations also appear to be less stable with respect to the blocking of RS. For instance, Agostiniani (1992) argues that RS may apply across a Complementizer Phrase (CP), or Inflectional Phrase (IP), boundary. The author reanalyzed examples presented in Napoli & Nespor (1979) and Nespor & Vogel (1986):

(14)

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Che c'è un perché [IP [kJ]arlo lo sa</td>
</tr>
</tbody>
</table>

'That there is a reason why, Carlo knows it'

---

3 Agostiniani (1992) argues that all (direct or indirect) syntax-based accounts of Raddoppiamento sintattico give rise to results that are at least partially incorrect. Criticisms affect among others Napoli & Nespor (1979), Nespor & Vogel (1979), (1982), (1986), and Kaisse (1985). Agostiniani (1992:3): "i dati che tutti questi lavori vengono portati a sostegno sono infatti derivati dai fatti sintattici sul raddoppiamento Sintattico fonologico, sia di quella indiretta [...], non hanno alcuno riscontro nella realtà linguistica cui si richiamano, cioè quella toscana" (italics are mine, cb).

4 The examples in (13ab) are taken from Napoli & Nespor (1979). Remarkably, the data reported in Napoli & Nespor (1979) contradict Nespor & Vogel's (1986) data. That is, RS between a subject and a predicate is reported as evidence in favor of the left-branch condition to phonological phrasing in Napoli & Nespor (1979), but it is excluded on the basis of Nespor & Vogel's (1986) relation-based approach.

5 The examples in (13cd) come from my own test-material. The test consisted of 54 sentences containing verb-subject sequences which were submitted to six educated Florentine speakers of Standard Italian. The informants varied in age between the 25 and 35 years. The verb-subject sequences were characterized by the proper segmental contexts for RS to apply, as well as by adjacency of two word resees. Application of RS was one of the mechanisms adopted by the informants to create sufficient distance between the two adjacent stresses associated with the verb and the subject.
b. Hanno eletto Artù [CP [p]:apa
'They have elected Arthur [as] pope'
c. Che siano tre [IP [n]:jon è dimostrato
'That (there) are three, has not been proved'

On the basis of these contradictory facts we may conclude that: (a) Raddoppiamento Sintattico is not bound to apply within the phonological phrase, or (b) the syntax-based definition of the phonological phrase does not fully match prosodic reality. In the course of this thesis, I shall argue in favor of the latter conclusion.

2.1.2.2 Stress Retraction and Phonological Phrasing

Stress Retraction is the second external sandhi phenomenon of Standard Italian that is argued by Nespor & Vogel to be ϕ-bounded. The process involves a leftward stress shift in order to avoid a clash between two lexical stresses (cf. Malagoli 1946, Camilli 1965, Savoia 1974/5):¹⁶

(15) a. (cìtta brúutta)ϕ > (cìtta brúutta)ϕ 'ugly city'
b. (parità presto)ϕ > (parità presto)ϕ '(he) will leave soon'

The examples in (15) consist of a head and a non-branching complement, i.e., of sequences which fall within the scope of Nespor & Vogel's ϕ-restructuring algorithm (cf. 10). Again, verb-subject sequences that are characterized by stress adjacency can also be subject to Stress Retraction. The examples in (16) come from the same Florentine test which I referred to in the previous section:¹⁷

(16) a. Oggi verrà Giòrgio? > Oggi verrà Giòrgio? 'Giorgio will come, today?'
b. So che la sà Giòrgio, la strada > So che là sà Giòrgio, la strada 'I know that Giorgio knows it, the street'

¹⁶ Against Nespor & Vogel's claim that Stress Retraction exclusively belongs to the northern variety of Standard Italian, and that Stress Retraction and Raddoppiamento Sintattico exclude each other mutually, a number of counterexamples have been reported. Savoia (1974/5) and Agostiniani (1992), for instance, show that Stress Retraction also exists in the Standard Italian variety of Tuscany. This is confirmed by the Florentine data I collected. Moreover, Stress Retraction and Raddoppiamento Sintattico may also co-occur (cf. Savoia 1974/5):

i. martedi pròssimo > mìndì [p]:pròssimo 'next tuesday'
ii. la verità vèrà > la vèztìa [v]:èrà 'the real truth'

Standard Italian words like sìaddìtto ‘so-called’ and càffè-au-lait ‘café-au-lait’ exemplify the lexicalisation of the two phenomena.

¹⁷ These facts are confirmed by Ghini (1993), in which similar examples of Stress Retraction are provided involving verb-subject sequences.
That is, in accordance with Nespor & Vogel’s ϕ-algorithms, these verb-subject sequences should form two phonological phrases instead of one. A head followed by a branching complement, too, may show up with retracted stress:

(17) Sara molto allegro > Sara molto allegro ‘It will be very cheerful’

Again, we may conclude that either (a) Stress Retraction is not bound to apply within the phonological phrase, or (b) the syntax-based definition of the phonological phrase does not fully match prosodic reality.

2.1.2.3 Troncamento and Phonological Phrasing

Troncamento, or Verb Final Vowel Deletion, refers to the optional deletion of a verb-final vowel. This vowel, either /o/ or /e/, must be preceded by a coronal sonorant, and followed by a consonant-initial word (cf. van Hoorn 1983, Vogel et al. 1983, Nespor & Vogel 1986). Van Hoorn (1983) and Nespor (1990a) argue that the vowel /o/ may only be deleted if the verb is followed by a complement within the same ϕ domain. Consider some examples:

(18) a. (sono partiti)ϕ > (son partiti)ϕ ‘(they) left’
b. al buio (vedono poco)ϕ > al buio (vedon poco)ϕ ‘in the darkness (they) see little’

Again, the application domain of the relevant phenomenon appears to be less stable than is suggested. Troncamento may also apply between two syntactic heads which do not exhibit a modifier-head or head-complement relationship. The examples in (19) contain verb-subject sequences in which the verb-final vowel is deleted (curly brackets embrace the relevant sequences).

(19) a. Al giorno d’oggi {parlano tutti} d’inquinamento ambientale. > Al giorno d’oggi {parlan tutti} d’inquinamento ambientale. ‘Nowadays everyone speaks about environmental pollution’
b. {Passano le ore} in un battibaleno. > {Passan le ore} in un battibaleno. ‘The hours pass in a wink’

The truncated forms were assessed by my Florentine informants as being perceptually more pleasing than the plain forms. Interestingly, the informants did

---

18 Since /o/-deletion involves only verbs, Nespor (1990a) argues for an analysis in terms of lexical precompilation (cf. Hayes 1990).
19 56 sentence pairs were submitted to the six informants. The informants were asked to select one of the two sentences as being the most pleasing for the ear.
not always prefer the truncated form over the plain form. That is, quite unanimously they preferred the truncated verb form in certain sentences, and the full verb form in other sentences. For instance, the plain form was selected with respect to the sentence in (20).

(20) > Oggi ce l’{hanno gli allievi nuovi}, l’esame.
Oggi ce l’{han gli allievi nuovi}, l’esame.
‘Today, the new pupils have it, the exam’

The regularity underlying the selections relates to the complexity of the verb-subject sequence. In brief, when the verb-subject sequence contains six or less syllables the truncated form is selected, but if the sequence contains more syllables the full form is selected.  

In sum, Nespor & Vogel’s (1986) syntax-based algorithms for φ-formation also prove to be problematic where Troncamento is concerned. As before, the conclusion is that either (a) Troncamento is not bound to apply within the phonological phrase, or (b) the syntax-based definition of the phonological phrase does not fully match prosodic reality.

2.1.3 Final Lengthening and Phonological Phrasing

Final Lengthening (FL) refers to the lengthening of the syllable that bears phrasal stress. In other words, the head of the phonological phrase is lengthened. Just as Stress Retraction, FL is not an exclusively Italian phenomenon. It is found in many languages (cf. Cruttenden 1986, Clark & Yallop 1990/5, Delais 1995). In contrast to RS, Stress Retraction and Troncamento, which are context-dependent phonological processes, FL is a context-free, or intrinsic property of phonological phrasing. Again, Nespor & Vogel’s φ-formation algorithms wrongly predict the application of FL in Italian. Consider the examples below, from Ghini (1993). Ghini’s (1993) data represent the results of duration measurements which he carried out on the basis of an elaborate set of Italian sentences. The non-branchingness clause in Nespor & Vogel’s φ-restructuring definition proves to be incorrect insofar as FL is concerned: the lexical word of the branching complement undergoes FL, but not the lexical word of the head.

20 The test sentences contained intransitive as well as unaccusative verbs. No systematic difference between these two verb types with respect to Troncamento could be observed (cf. Helsloot 1985). Henceforth, subjects of unaccusative verbs which are base-generated in object position (cf. Bursin 1986) behave similarly to inverted subjects of intransitives, constituting verbal adjuncts, with respect to Troncamento. See Ghini (1993) for the same conclusion with respect to the phenomenon of Stress Retraction: SR applies between verb-subject sequences irrespective to the verbal classification, and thus to the object or adjunct status of the subject.
THEORETICAL BACKGROUNDS

(21) a. (Le mura di Bergamo) sono storicamente importanti
   "The walls of Bergamo are historically important"

b. (La lotta per la pace) deve riguardare tutti
   "The struggle for the peace must concern everybody"

The non-recursive side clause of Nespor & Vogel's $\phi$-formation algorithm also does not stand up to scrutiny. Ghini's measurements document that FL may indeed affect a modifier. In accordance with Nespor & Vogel's definitions, the heads insalata and frutti should be lengthened instead of the modifiers bella and molti:

(22) a. (Una bella) (insalata di mare)
   "a nice sea-food salad"

b. (Mangia molti) (frutti di bosco)
   "he eats lot of fruits of forest"

Again, the conclusion is either that FL is not $\phi$-bounded, or that Nespor & Vogel's $\phi$ definition does not fully match prosodic reality.

2.1.4 Summary

In the above paragraphs, I pointed to some of the problems regarding the $\phi$-formation algorithms defined by Nespor & Vogel (1986) in relation to the application of external sandhi phenomena in Italian. Raddoppiamento Sintattico, Stress Retraction, Troncamento and Final Lengthening are observed in contexts in which they should not, according to Nespor & Vogel's theory, occur. To summarize, new Italian phonological data show that (a) elements on the nonrecursive side of the head of a maximal projection are not always phonologically dependent on the head, (b) syntactically branching complements may form a single $\phi$ constituent with their head, and (c) two syntactically, relatively unrelated heads may form a single $\phi$ constituent. In other words, either the application domain of these phenomena is not the phonological phrase, or Nespor & Vogel's (1986) algorithms are too strong to account for the application of these phenomena.

The other issue that was taken up was the type of evidence cited in favor of prosodic constituency. In Nespor & Vogel's *Prosodic Phonology*, as in most other variants of phonological phrasing, virtually no attention is paid to the intrinsic properties of prosodic domains. Recourse is made to context-dependent segmental processes that apply across word boundaries. Context-free properties, expressed in terms of phonetic correlates of stress and boundaries, are hardly formalized by phonologists. In the field of metrical phonology and intonational phonology, by contrast, insightful results are obtained in this area.
2.2 Metrical Phonology and Properties of Stress

In this section I shall first introduce some of the notions and principles underlying the theory of metrical phonology. Afterwards, I focus on Italian. Degrees of stress as well as the phonetic correlates associated with these stresses are introduced.

2.2.1 Metrical Phonology

metrical theory, i.e. the theory that accounts for the relational patterns of stress, was initially formalized by Liberman (1975) and Liberman & Prince (1977). In order to represent the prosodic pattern of an utterance, Liberman (& Prince) introduced the metrical tree as well as the metrical grid. The hierarchically ordered metrical tree reflects the prominence relations which emerge from the syntactic surface structure; the metrical grid reflects the rhythmic structure of the timing of the prosodic events. Soon afterwards, the relational metrical tree was replaced by the prosodic constituent tree (cf. Selkirk 1980). In the past fifteen years, the need to distinguish a constituent representation from a grid representation (cf. Prince 1983, Selkirk 1984a) has been a subject of debate. By now, most linguists reject this distinction as superfluous in relation to the lowest phonological levels, i.e. the foot and the prosodic word. Moreover, an integration of the two representations has been proposed, which evolved into the bracketed grid or constituent grid representation (cf. Hammond 1984, McCarthy & Prince 1986, Halle & Vergnaud 1987, Hayes 1987, 1995, Steriade 1988, van der Hulst 1991, Kager 1993ab). While metrical phonology was originally concerned with matters of rhythm and stress, and prosodic phonology with the domain-bound application of segmental processes, recent research has shown that both phonological properties refer to the same metrical constituents. Regarding the foot, for instance, it has been found that issues relating to (a) rhythm and stress, (b) the application of segmental processes, and (c) morpho-phonological interactions, refer to one and the same foot constituent (cf. Hayes 1995, McCarthy & Prince 1986, 1990, 1993a, Prince & Smolensky 1993, Booij 1995, Kager 1995b).

The universal foot inventory contains three foot types: the syllabic trochee, the moraic trochee and the iamb. The syllabic trochee is insensitive to syllable weight, the moraic trochee contains two light syllables, and the iamb contains a light plus heavy syllable (cf. Hayes 1995). The trochaic foot types on the one hand, and the iambic foot type on the other, reflect the perceptual universal that rhythmic elements differ in either intensity or duration. That is, elements alternating in intensity are

21 See (1), in section 2.1, for the prosodic constituent hierarchy.
22 Hayes (1995:33) formulates this Iambic/Trochaic Law as follows:

Iambic/Trochaic Law
a. Elements contrasting in intensity naturally form groupings with initial prominence.
b. Elements contrasting in duration naturally form groupings with final prominence.
perceived as being grouped in trochees, and elements alternating in duration are perceived as being grouped in iambs.

With respect to the principles which are deemed to underly metrical phonology on the one hand, and prosodic phonology on the other, there are nonetheless some crucially conflicting notions, namely those involving branchingness and alternation. More concretely, the n-ary branchingness principle, which Nespor & Vogel (1986) assume to be part of the Strict Layer Hypothesis (cf. (3)), and the Principle of Rhythmic Alternation are contradictory. Consider the Principle of Rhythmic Alternation in (23) as formulated by Selkirk (1984a:52) (but see also Liberman 1975, Liberman & Prince 1977, Prince 1983, Hayes 1984), and Principles 3 and 4 of the Strict Layer Hypothesis, for convenience repeated in (24):

(23) Principle of Rhythmic Alternation (PRA)
   a. Every strong position on a metrical level n should be followed by at least one weak position on that level.
   b. Any weak position on a metrical level n may be preceded by at most one weak position on that level.

(24) Strict Layer Hypothesis

Principle 3. The hierarchical structures of prosodic phonology are n-ary branching.
Principle 4. The relative prominence relation defined for sister nodes is such that one node is assigned the value strong (s) and all other nodes are assigned the value weak (w).

While the PRA ensures that a strong rhythmic beat is followed by minimally one and maximally two weak rhythmic beats, Principles 3 and 4 of the SLH allow for an indefinitely long sequence of non-alternating weak labeled nodes. Compare the two representations in (25). In (25a), the x’s are organized in accordance with (23), and in (25b), in accordance with (24).

(25)  

According to Nespor & Vogel (1989) and Nespor (1990b), the metrical grid (cf. 25a) is construed on the basis of the prosodic constituent tree (cf. 25b). In other words, the syntactic surface structure provides information on the basis of which the prosodic constituent hierarchy is constructed, and the prosodic constituent hierarchy provides information on the basis of which the metrical grid is constructed:
The question is, how can we reconcile (23) and (25a) on the one hand, and (24) and (25b) on the other. Moreover, if the surface realization of a language X gives rise to a rhythmically wellformed pattern, why should we need to assume an intermediate stage of X whose output is arhythmic? In other words, what evidence is there that a language should be considered to have a metrically unbounded system at some level of derivation, while its phrasal outputs are metrically bounded? With respect to the syllable and the foot, recent research on a variety of languages provides an abundance of evidence in favor of binary (or maximally ternary) constituency instead of n-ary constituency (cf. Halle & Vergnaud 1987, van der Hulst 1991, Hayes 1995). As will be shown in chapter 4, the Italian foot system does not deviate from this pattern: the Italian foot contains either two or three syllables. But also above the foot level, Italian appears to be a metrically bounded system. For example, Vogel & Scalise (1982) and Helsloot (1993) argue in favor of rhythmic patterns at the word level, and Beccaria (1964) in favor of rhythmic patterns at the phrase level. Hardly any formal proposals have been made, however, regarding the metrical structure of the prosodic word and the phonological phrase. In addition, the question of whether prosodic words and phonological phrases still require a prosodically as well as a metrically based analysis has not been addressed as such.

2.2.2 Clashes and Lapses

The Principle of Rhythmic Alternation, i.e. the basic tenet of metrical phonology, is stated in order to account for rhythmically illformed patterns. The stress properties of separate words may be in conflict when words are put into a phrasal context. That is, each word is characterized by its own lexical stress. At the surface, however, the lexical stresses of two adjacent words may give rise to either a stress clash or a stress lapse. The grid representations in (27) illustrate the various patterns that may arise at the surface. (27a) and (27b) are well-formed metrical representations, i.e., any strong position (two-x column) is followed by at least one weak position (one-x column), and a weak position is preceded by at most one other weak position. (27a') and (27b'), in contrast, are ill-formed metrical representations, since a strong position is immediately followed by another strong position (cf. 27a'), and a weak

---

23 The notions bounded/unbounded have been introduced in the literature in order to distinguish languages whose word-level metrical organization is based on binary (or ternary) branching feet, from languages whose word-level metrical organization is based on feet without an upper limit on the number of branches (cf. Hayes 1981, 1995, Halle & Vergnaud 1987).
position is immediately preceded by more than one other weak position (cf. 27b').

The former configuration is referred to as a stress clash, and the latter as a stress lapse (cf. Selkirk 1984a, Hayes 1984, Nespor & Vogel 1989).

(27)  
\[\begin{array}{cccc}
X & X & X & X \\
\end{array}\]  

a. \[\begin{array}{cccc}
X & X & X & X & X \\
\end{array}\]  

a'. \[\begin{array}{cccc}
X & X & X & X & X \\
\end{array}\]  

b. \[\begin{array}{cccc}
X & X & X & X & X \\
\end{array}\]  

b'. \[\begin{array}{cccc}
X & X & X & X & X \\
\end{array}\]  

Clashes and lapses disturb the rhythmic alternation. However, the rhythmic alternation appears to be such an overwhelming cognitive and physical reality that the phonetic surface is mainly bare of clashes and lapses. That is, although lexical representations of words may give rise to rhythmically ill-formed phrasal input-patterns, in the phonetic output these patterns are for the most part resolved. An important part of this thesis deals with the tension between lexical stress representations on the one hand, and rhythmically well-formed phrasal outputs on the other.

### 2.2.3 Stress Properties of Italian

Metrical phonology accounts for patterns of stress. But what is stress? And how many levels of stress must be distinguished? Regarding the phonetics of stress, it is well-known that cues for linguistic stress are multiple and hard to define in absolute terms (cf. Fry 1955, 1958, Lea 1977, Beckman 1986, Clark & Yallop 1990/5). As in many languages, stress in Italian is realized by means of a combination of duration, loudness and pitch. Of these three correlates, duration appears to be determinant with respect to word stress (cf. Magno Caldognetto & Fava 1974, Bertinetto 1981, Marotta 1985), and pitch with respect to phrase stress (cf. Bertinetto 1981, Avesani 1990). Loudness appears to be the weakest structural contributor to the realization of stress in Italian. Leaving aside for the moment these phonetic cues, let me summarize the various proposals regarding the number of stress degrees that have been distinguished in the literature, as well as the relation between these stresses on the one hand, and linguistic domains on the other.

In the literature, five levels of stress are often distinguished: (a) zero stress, (b) secondary stress, (c) primary stress, (d) phrasal stress, and (e) sentence stress (or intonational stress) (cf. Cruttenden 1986). In most descriptive grammars of Italian, such a five-level stress system is in fact assumed (cf. Camilli 1965, Agard & Di Pietro 1965, Muljačić 1972). In what follows, I shall first introduce the notions zero stress, secondary stress and primary stress. Subsequently, I shall deal with phrasal stress
and sentence stress. In order to account for these latter types of stress, I shall refer to Avesani’s (1990) model for automatic synthesis of Italian intonation.

2.2.3.1 Zero Stress, Secondary Stress and Primary Stress

Lexical items belonging to the morphological categories Noun, Verb, Adverb and Adjective are generally held to be characterized by primary or main word stress. Functional items like auxiliaries, prepositions and pronouns, by contrast, are considered to lack such a stress. Clearly, this distinction refers to the lexical representation of these items, not to the surface realization per se. For instance, a preposition may receive phrasal stress for reasons of emphasis. Nonetheless, phrasal outputs and lexical representations are intricately related to one another: lexical items generally surface with one of the relatively high degrees of stress, while functional items generally surface with one of the relatively low degrees of stress. Since the degree of stress of a single (lexical or functional) word varies depending on the phrasal context in which it occurs, it is not always easy to establish what the lexical stress representation of a word looks like. Especially in regard to functional items, linguists avoid making explicit statements about their input stress representation.

Nespor & Vogel (1986:110) argue that each terminal element of a syntactic tree, whether it is a functional item or a lexical item, constitutes minimally a prosodic word.24 Other theories, although mainly restricted to lexical items only, define the prosodic word on the basis of word stress: a prosodic word is a lexical item with a single main stressed syllable (cf. Booij 1983, 1988, 1995, Selkirk 1984a, Hayes 1984, Giegerich 1985, McCarthy & Prince 1986, Halle & Vergnaud 1987, Kager 1989, Goldsmith 1990). In chapter 4, I shall propose a theory of lexical metrical representation which combines the two informational sources: morphological information and metrical information.

With respect to Italian, I assume with Camilli (1965), Muljačić (1972), Agard & Di Pietro (1965), Crisari & D’Addio (1967), Bertinetto (1981), and others, the following lexical representations: (a) lexical items have primary stress, (b) monosyllabic functional items have zero stress, and (c) disyllabic functional items have secondary stress. Consider the examples in (28). Primary stress is indicated by ‘’, and secondary stress by ‘’.

---

24 Nespor & Vogel (1989) claim that the difference between lexical items and functional items is accounted for in rhythmic (= metrical) phonology. That is, in rhythmic phonology, which is assumed to be ordered after prosodic phonology, prosodic word constituents associated to function words are not translated into metrical grid positions. More precisely, non-branching prosodic word constituents associated to function words are labeled weak, and these weak labeled ω’s do not receive a grid position at the second and third grid level.
THEORETICAL BACKGROUND

31

2.2.2.2 Phrasal Stress and Sentence Stress

The notions phrasal stress and sentence stress are used here as generic terms of a number of phonetic properties which may refer to the stress bearing element itself as well as to boundary properties of the constituent involved. Lexical items, i.e., items that are lexically characterized by main stress, may be bearers of phrasal stress or sentence stress. A phrasal stress in Italian is realized by a pitch accent. Avesani (1990) argues that Italian has four pitch accents: two simple tones H* (= high pitch accent) and L* (= low pitch accent), and two bitonal or complex tones H+L* and L+H*. Although bearers of pitch accents are items that are lexically characterized by main stress, not all main-stress items are associated with a pitch accent at the phrasal level. Avesani observes indeed that of a sequence of two lexical words the first word may be subject to stress (or accent) deletion. This stress deletion implies that the relevant word does not receive a target F0 value and that the duration of its lexically stressed syllable is reduced (cf. Avesani 1990:18-9). Instances of stress deletion typically include noun-noun, adjective-noun, auxiliary-verb and verb-verb sequences. Consider some examples from Avesani:

(29) a. degli anni ottanta. > degli anni ottanta 'of the eighties'
    H+L*

b. gia siglata > gia siglata 'already initialed'
    H*
I will take the notion sentence stress as referring to the phrasal prominence properties which do not only involve the head syllable of the stressed word, but also the post-head syllable(s) as well as the boundary tones of the relevant constituent. Avesani distinguishes two post-head or posttonic phrase accents, H- and L-, and two boundary tones, H% and L%.\textsuperscript{26} Again some examples from Avesani:

\begin{enumerate}
\item \[\ldots\text{le prospettive produttive }\ldots\] ‘the productive perspectives’
\item \[\ldots\text{dalle due case automobilistiche. }\ldots\] ‘of the two motor companies’
\end{enumerate}

In addition to the tonal properties of heads, post-heads and boundaries, duration is also crucially involved at the phrasal level.\textsuperscript{27} That is, phrasal constituents can be associated with lengthening phenomena or with pauses. The various combinations of tonal and durational properties underlie the recognition of different phrasal constituent domains (cf. Farnetani 1989). With respect to Italian, Avesani distinguishes three phrasal constituents: (a) the Accent Unit, (b) the Intermediate Phrase and (c) the Intonational Phrase. Table 2.1 schematizes how constituents on the one hand, and phonetic properties on the other are associated with one another (PA=Pitch Accent, PHA=Post-head Accent, BT=Boundary Tone, FL=Final Lengthening, P=Pause).

\begin{table}[h]
\centering
\begin{tabular}{|c|c|c|c|}
\hline
 & Accent Unit & Intermediate Phrase & Intonational Phrase \\
\hline
PA & one & one or more & one or more \\
PHA & - & one & one or more \\
BT & - & - & one \\
FL & - & minor & major \\
P & - & - & yes \\
\hline
\end{tabular}
\caption{Phonetic Properties of Phrasal Constituents}
\end{table}

Let me compare now Avesani’s speech synthesis units with the constituents of the prosodic hierarchy (see (1)). The phonological phrase, which I assume to be the smallest phrasal domain in the prosodic hierarchy, has to correspond with the Accent Unit, being the smallest phrasal domain in the speech synthesis model. But the phonological phrase is also characterized by Final Lengthening (cf. Nespor & Vogel 1986, Ghini 1993). Since in the speech synthesis model FL is held to be a

\textsuperscript{26} See Pierrehumbert (1980), Beckman & Pierrehumbert (1986) and Pierrehumbert & Beckman (1988), which Avesani based her model for the automatic synthesis of Italian intonation.

\textsuperscript{27} Recall from section 2.1.3 the phenomenon of Final Lengthening.
property of the Intermediate Phrase (and Intonational Phrase), we may conclude that the phonological phrase shares properties with both the Accent Unit and the Intermediate Phrase. As for the Intonational Phrase, which occurs as a unit in both the prosodic hierarchy and the speech synthesis model, correspondence seems to be straightforward: both are associated with final lengthening effects, and both are followed by a pause (cf. Selkirk 1984a, Nespor & Vogel 1986). Notice that, similar to the units of the prosodic hierarchy, the speech synthesis units are not constrained by maximality conditions. That is, Avesani's model does not impose an upper limit on the number of Accent Units to be enclosed by an Intermediate Phrase, or on the number of Intermediate Phrases to be enclosed by an Intonational Phrase.

In spite of the just mentioned correspondences, Prosodic Phonology and the model for automatic speech synthesis differ crucially from one another with respect to the primary motivation of phonological constituency: while the syntactic surface structure motivates the former, phonetic correlates motivates the latter. Tentatively, the approaches can be said to be complementary: linguistic information on the one hand, and inherent phonetic properties on the other. In the present thesis, both types of information are taken in consideration in providing a model of phonological phrasing. Section 2.4 presents the details.

2.2.4 Summary

Relational stress patterns that are observed at the phrasal level will be theoretically accounted for on the basis of the principles of Metrical Phonology. Stress patterns are assumed to be constrained by the Principle of Rhythmic Alternation. This implies that lexically induced stress clashes or lexically induced stress lapses must be properly resolved. Regarding degrees of stress, I assume a five-level system of prominence degrees for Italian: zero stress, secondary stress, main word stress, phrasal stress and sentence stress. In order to identify these stress degrees, reference must be made to linguistic information, like prosodic constituency and the morphological distinction lexical/grammatical word, as well as to phonetic information.

2.3 Principles of Italian Versification

As mentioned previously, the corpus of analysis on the basis of which I intend to propose a theory of phonological phrasing consists of the poetry of Giuseppe Ungaretti and Eugenio Montale. In what follows, I shall first address the versificational principles to which I refer in order to provide a preliminary analysis.

28 See Hayes & Lahiri (1991) for a clear account of intonational phrasing in Bengali, in which tonal properties are related to the phrasal constituents of the Prosodic Hierarchy.
of the data. The line of verse and syllable-count criteria are crucial here. The ideal metrical grid representation of the various meters will be introduced. Afterwards, I shall discuss two sound-level properties which help us to distinguish poetic language from non-poetic language. With these properties in mind, it will be easier to evaluate the theoretical proposals regarding phonological phrasing in general.

2.3.1 Lines of Verse

In order to analyze the phrasal phonological properties of the verse data, I have selected the line of verse as the relevant information domain. A line of verse is a horizontally printed string of words flanked on both sides by blanks. In the poetry of Montale and Ungaretti, a variety of different line types is found. That is, lines may differ among each other with respect to the number of metrical positions they enclose. Let me present the criteria which underlie the determination of a line type. The metrical position, being identified as the smallest versification domain, is generally in one-to-one correspondence with the syllable (cf. Halle & Keyser 1971, Elwert 1973, Piera 1980). The line in (31) exemplifies this one-to-one correspondence. Each syllable node (o') corresponds with a metrical position (indicated by numerals).

(31) \( \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \sigma \)  

\[ \text{la raffica che t'incollo la veste} \]  

\[ 1 \ 2 \ 3 \ 4 \ 5 \ 6 \ 7 \ 8 \ 9 \ 10 \ 11 \]  

'the squall that wrapped you in your dress'

The line exemplifies the hendecasyllable, i.e. the eleven-syllable meter (from now on referred to as \( \lambda=11 \)). The main property of the \( \lambda=11 \) is that the penultimate position of the meter, i.e. the tenth position, is strong. This strong-weak tail at the end of a line is typical of all Italian meters. A line instance the final word of which has penultimate stress is called piano (cf. 32a). If the final word has antepenultimate stress, it is called sdrucciolo (cf. 32b), and if the word has final stress, it is called tronco (cf. 32c). In phonological terms, the sdrucciolo can be said to be characterized by syllable extrametricality, tronco by syllable catalexis. See Hayes (1982), Harris (1983) and Archangeli (1986) for the extrametricality, and Kiparsky (1991), Kager (1995c), Burzio (1994) and Jacobs (1994a) for the catalexis. See Prince (1989) for extrametricality and catalexis in iambic vs. trochaic meter.

---

29 Italian poetry does not differ here from English or Spanish poetry.
30 In fact, the names of the various meters refer to line instances whose final word is characterized by penultimate stress. Thus, the strongest position of the settenario (\( \lambda=7 \)) is the sixth position; the strongest position of the guainaro (\( \lambda=5 \)) is the fourth position, and so on.
31 In phonological terms, the sdrucciolo can be said to be characterized by syllable extrametricality, and the tronco by syllable catalexis. See Hayes (1982), Harris (1983) and Archangeli (1986) for the extrametricality, and Kiparsky (1991), Kager (1995c), Burzio (1994) and Jacobs (1994a) for the catalexis. See Prince (1989) for extrametricality and catalexis in iambic vs. trochaic meter.
As shown by the underscored vowels in (32c), two adjacent vowels may be associated with one metrical position. The basic assumption is that Italian, like most other languages, prefers CV syllables. As a consequence, onsetless syllables look for a consonant to realize their onset position. Thus, a [CV]₀ [V]₁ sequence becomes [CV]₀ or [CVV]₀. This syllable optimization cannot always be achieved, however. In what follows, I shall introduce the phonological properties that are drawn in the syllable-count criteria.

A first distinction involves the higher domain within which the vowels occur. That is, the two vowels either belong to one and the same word, or they belong to two separate words. Within both domains, the adjacent vowels are associated with either one or two metrical positions. In sum, we find (a) adjacent vowels within a single word corresponding to one metrical position, (b) adjacent vowels within a single word corresponding to two metrical positions, (c) adjacent vowels of two different words corresponding to one metrical position, and (d) adjacent vowels of two different words corresponding to two metrical positions.³² A second distinction involves stress. That is, if one of the two vowels is stress-bearing either an one-to-one or two-to-one association is observed. As shown in table 2.2, within-word adjacency differs from across-word adjacency with respect to this stress property: a stressed vowel plus a following unstressed vowel are associated with one position if the vowels belong to the same word, but they are associated with two metrical positions if they belong to two separate words. A third distinction involves the featural properties of the relevant vowels: (a) the semi-vowels [j] and [w] are always associated with the same metrical position as the preceding or following full vowel, and (b) identical vowels of which the second one is stressed are always associated with two metrical positions. Consider table 2.2 and the examples in (33) and (34) (boldfaced V stands for a stressed vowel, p stands for a metrical position, and α refers to identity of vowels):

³² These correspondences are traditionally distinguished in the literature on Italian versification: (a) is called *hyperœsis*, (b) *diaeresis*, (c) *prosopoeia*, and (d) *diaithphora* (cf. among others, Bertinetto 1973, Elwert 1973, Di Girolamo 1976, Beltrami 1991).
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Table 2.2 Syllable-to-Metrical Position Count**

<p>| | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>1. VV</td>
<td>&gt;</td>
<td>1p</td>
</tr>
<tr>
<td>2. VV</td>
<td>&gt;</td>
<td>1p</td>
</tr>
<tr>
<td>3. V(u/a) V</td>
<td>&gt;</td>
<td>1p</td>
</tr>
<tr>
<td>4. V(u/o/a) V</td>
<td>&gt;</td>
<td>2p</td>
</tr>
<tr>
<td>5. VV</td>
<td>&gt;</td>
<td>1p</td>
</tr>
<tr>
<td>6. VV</td>
<td>&gt;</td>
<td>2p</td>
</tr>
<tr>
<td>7. Vα Vα</td>
<td>&gt;</td>
<td>1p</td>
</tr>
<tr>
<td>8. Vα Vα</td>
<td>&gt;</td>
<td>2p</td>
</tr>
</tbody>
</table>

(33) [... V V...]

σ σ

1. Con var i e t à d'inganni
   P
   'With variety of deceptions'

2. all'agon i a d'ogni essere. Oggi torno
   P
   'the agony of every being. Today I come home'

3. Uguale a un mare che irrequieto e blando
   P
   'Similar to a sea that restless and delicate'

4. Nella p a m ra del palpito
   P P
   'In the fright of throb'

(34) ...Vα a[V...]

σ σ

1. e ogni cosa si tend la flottiglia
   P
   'and everything reaches out to the flotilla'

2. Eravamo nell' et...i lassa.
   P P
   'We were in the deluded age.'

3. all'agonia d'ogni essere. Oggi torno
   P P
   'the agony of every being. Today I come home'

4. Dall'amp...n sia dell'alba
   P P
   'From the ample anxiousness of dawn'
A complex issue related to the above syllable-count criteria concerns the phonetic realization of the adjacent vowels in poetry read aloud. What happens to vowels that are subject to a two-to-one association? Beltrami (1991:148) argues that both vowels are pronounced although within the conventional time of a single syllable. A phonological analysis concerning vowel adjacency in spoken Italian is advanced in Kuhlman (1991): the degree of reduction under vowel adjacency depends on (a) the location of stress, (b) the sonority of the relevant segments, (c) the degree of prosodic juncture, and (d) the rate of speech. Accordingly, the effects are gradual: vowel deletion at one extreme, and overt realization of both vowels at the other. In chapter 5, I shall propose an optimality theoretical constraint-based account for some of these effects. Constraints ensuring proper realization of onset positions, foot positions and the head position of a phonological phrase challenge the constraint that ensures the proper realization of a vowel.

To summarize, the analysis of the poetry of Montale and Ungaretti starts with the presentation of a line typology. This line typology is based on the grouping of lines of verse in accordance with the number of metrical positions they contain. Especially in poems which lack a clear-cut underlying meter, it is not always easy to establish the exact line type. Whenever one-to-one correspondence between syllables on the one hand, and metrical positions on the other, is hampered by sequences of adjacent vowels, I shall refer to the syllable-count criteria as set out in table 2.2. This means that instances of bounded verse and instances of free verse are treated equally with respect to these syllable-count criteria.

2.3.2 Generative Metrics: The Metrical Ideal

A crucial claim in theories of Generative Metrics is that the metrical organization of poetry can be best accounted for if an ideal abstract pattern is assumed to underlie verse realization (cf. Halle & Keyser 1966, 1971, Kiparsky 1977, Piera 1980, Kiparsky & Youmans 1989). On the basis of this ideal pattern, or prototype line, actual realizations can be evaluated as beingmetrical or unmetrical, or as being more or less complex. I follow Hayes (1989a) and Prince (1989) in representing the prototype line as a multi-layered metrical organization of strong and weak positions. I assume the metrical grid (and not the metrical tree) to be the appropriate representation at this point. That is, the prototype line is represented in terms of a regular recurrence of beats. No information is provided about the phrasing of the beats into constituents. The ratio of recurrence of the beats is set at 1:2, which gives a strictly binary alternating pattern. Since Italian meters are primarily characterized by their final strong-weak tail, the prototype metrical grids of the various line types take the pre-final position as the strongest position of the line. This implies that strictly binary alternating grids are constructed from right-to-left. The number of grid levels that is needed to ensure binary alternation throughout the line is proportional to the number of positions a line contains. For instance, the $\lambda=3$ (i.e. the three-
positions line) requires two grid levels, the $\lambda=7$ four and the $\lambda=14$ five grid levels in order to ensure binary alternation:

\begin{equation}
\text{Metrical Grid: } \lambda=3
\begin{array}{c}
\times \\
1 & 2 & 3
\end{array}
\end{equation}

\begin{equation}
\text{Metrical Grid: } \lambda=7
\begin{array}{c}
\times \\
1 & 2 & 3 & 4 & 5 & 6 & 7
\end{array}
\end{equation}

\begin{equation}
\text{Metrical Grid: } \lambda=14
\begin{array}{c}
\times \\
1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 & 9 & 10 & 11 & 12 & 13 & 14
\end{array}
\end{equation}

In chapter 3, these prototypical metrical grid representations are adopted in order to facilitate the analysis of the phrasal phonological organization of the verse data.

2.3.3 Poetic Language versus Non-Poetic Language

Poetic language is popularly regarded as formally deviant from prose or spoken language. I shall focus on phonology-related issues in order to mark off the limits of this formal deviancy. Repetition and concrete time are the two relevant issues to be discussed here.

Patterns of repetition on all levels of sound, syntax, lexical choice and meaning typically characterize poetic language (cf. Jakobson 1960, 1961). On the sound level, two types of sound repetition can be distinguished: segmental repetitions like alliterations, assonances, consonances and rhyme, and metrical repetitions like recurrent feet and line patterns. In non-poetic language these patterns of repetition also occur, but generally in a less concentrated form. Take the foot. If a language surface structure has disyllabic as well as trisyllabic feet (as is the case in Italian), sequences of disyllabic feet, sequences of trisyllabic feet as well as sequences of mixed disyllabic and trisyllabic feet will occur. In highly metered poetry, like nursery rhymes, just one foot type is found (the trochaic one, in the case of Italian nursery rhymes). The poetry of Ungaretti and Montale is relatively free in this regard. As in
non-poetic Italian, disyllabic feet alternate with trisyllabic feet. Moreover, in the poetry of Ungaretti and Montale, all kind of segmental as well as metrical repitions can be found, but none of them are all-pervasive. As for metrical patterns of repetition, the non-pervasiveness of these patterns is most clearly illustrated by the verse line. Especially in the case of Ungaretti, there are many poems which lack systematic repetition of an identical meter. In chapter 3, a different kind of metrical repetition will be presented which characterizes the poetic practice of both Ungaretti and Montale. The domain of repetition concerns the phonological phrase rather than the foot or the verse line. In sum, repetition as well as the frequency and consistency with which repetitive patterns occur are key factors in establishing the deviancy of poetic language relative to non-poetic language.

Concrete time is the second issue that crucially contributes to the observed deviancy of poetic language. By concrete time I mean measurable time expressed in terms of (milli)seconds. The point at hand can be illustrated by a pilot study carried out by Lehiste (1985). Lehiste measured the average duration of trochaic feet in a number of English poems. The authors of the poems were asked to read their poems as poems and as prose. Against Lehiste's expectation rather than there being more regular foot durations in the poetry reading than in the prose reading, the opposite was found. The average durations of the feet were greater in texts read as poetry than in the same texts read as prose. In addition, the standard deviations appeared to be larger in the poetry readings than in the prose readings. Especially, this latter aspect contributes to the higher degree of variability, expressed in concrete time, of feet in poetry vs. prose. The same duration properties were found with respect to the line of verse: strings of words making up a line were realized with higher average duration in the poetry reading than in the prose reading, and the standard deviation was also larger in the former reading than in the latter. In sum, the average duration of prosodic units in poetry is larger than the average duration in prose. And, the durational variability of a prosodic unit in poetry is larger than in prose. However, the metrical structure of the feet (whether of poetry or of prose) was the same: the syllabic trochee (according to Lehiste).

Although neither phonetically measured nor compared with a prose reading, the recordings of Ungaretti and Montale of their own poetry contain audible durational variations. Especially, the recordings of Ungaretti are loaded by extreme durational effects. An important question is whether these durational effects are phonologically relevant or not. In other words, is a durational effect a function of phonological lengthening or shortening, or is it a function of paralinguistic or speaker-specific expressiveness? Moreover, is it part of the linguistic core-grammar or not? On the basis of the results of the perception test (to be introduced below) on the one
hand, and the prosodic structure of the linguistic input on the other, it appears that
the two functions can be easily separated from one another. Basically,
phonologically relevant information is perceived, phonologically irrelevant
information is not. In this thesis, the phonological relevance of phonetic correlates
is concerned, not their paralinguistic relevance.

2.4 Method of Research

In chapter 3, the poetry of Montale and Ungaretti is phonologically analyzed. The
methods of analysis are presented in the next subsections. I will start with the
analysis of the recorded poems.

2.4.1 Recorded Poems and Perception Task

Both Montale and Ungaretti recorded readings of their own poetry. I presented a
selection of these recordings in the form of a perception task to five subjects. The
selected material consisted of 304 lines of Montale and 219 lines of Ungaretti.35
Four of the subjects were Italian native speakers, and one a Dutch native speaker,
unacquainted with Italian. Three subjects (the Dutch one and two Italians) analyzed
the entire corpus of recordings, the other two analyzed fragments. The subjects,
varying in age between 25 and 40 years, were either university students or
researchers.36 The Dutch listener was a highly trained phonetician, and one of the
Italian informants was acquainted with phonological theories. The two Italian
native speakers who analyzed the entire corpus were not acquainted with
phonological theories. The subjects listened to the recorded poems and were asked
to identify prominent syllables as well as phonation breaks within and between
lines of verse. The recordings were presented through a Sanyo 9600 tape-recorder
and Sony MDR-V100 headphones.

The Italian informants received printed versions of the recorded poems. These
printed versions were identical to the published versions. The printed version
presented to the Dutch informant, in contrast, was bare of interspaces separating
one word from the other, in order to avoid interference of the printed
representation.37 The readings of the poems were presented line by line. Each
realization of a line was first presented two times. Subsequently, sequences of lines

---

35 Of the 219 lines of Ungaretti, 69 are read by the Italian actor Giancarlo Sbragia. These 69 lines
constitute the poem I Fiumi. See Appendix A for the titles of the recorded poems, and for information
about the recordings.

36 Since the subjects were just asked to listen to the presented material, I assume the regional variations
in their Italian not to be important.

37 Firstly I also submitted a printed version without interspacing to one of the Italian subjects. The
listening task appeared to be too complicated in this form. A conventionally printed representation
was an evident prerogative in order to obtain satisfactory parsing results.
were given. Subjects were allowed to change their opinion and to re-listen as often as they wished. The questions that accompanied the test were the following:

(36) a. Indicate the positions of the most prominent syllables of the line. 
   b. If you perceive different degrees of prominence, please indicate these differences. 
   c. Indicate the positions of breaks in the continuous stream of speech, either within or between lines.

The methodology of the analysis is correlational. The more the subject judgments agree, the stronger the assumed prominence and boundary-ship. In the case of contradictory judgments, I took also in consideration the prominences and breaks I perceived.

The listeners applied a four-degree stress distinction. In accordance with the degrees of stress distinguished in section 2.2.3, this four-degree system gives rise to: (a) zero stress, (b) main word stress, (c) phrasal stress and (d) sentence stress. Crucially lacking is secondary word stress. This is due to the fact that syllables with secondary word stress were not perceived as being prominent. Thus, in phrases like *sui/a tavola* 'on the table' or *l'astinenza* 'the abstinence', only one stress was perceived, namely the main stress of the lexical item: *sui/a trivola, l'astinenza*. A language-universal argument as well as a language-specific argument provide evidence, however, in favor of a prosodic representation including foot stress: (a) it is universally attested that rhythmic alternation groups identical elements in sets of two elements each, such that either the first or the second element constitutes the head of the set, and (b) Italian native speaker intuitions agree with respect to secondary stress location when the relevant words are presented in isolation. That is, the first syllable of *sui/a* and the initial syllable of *astinenza* are considered to bear more stress than the second syllable of these words.

Although not specifically asked, the informants assigned also various degrees of breaks. A three-degree distinction was observed: (1) no break, (2) weak break and (3) strong break.3B The correlation between break and prominence appears to be as follows: a sentence stress is generally accompanied by a strong break, a phrasal stress by either a weak break or no break, and main word stress by no break. In the following section, I shall illustrate these perceived parsings.

2.4.2 NV-Parsing versus PR-Parsing

In addition to the just outlined analysis of the recordings, the entire corpus of poetry under analysis is phonologically parsed into phonological phrases by means

---

3B Although seldomly assigned, a fourth type of interruption was distinguished: an interruption between two segments which nonetheless were linked to each other by liaison. These cases can be interpreted as providing evidence in favor of a parsing approach which focuses on heads and prominences instead of edges and pauses.
of Nespor & Vogel’s φ-formation algorithms. The results of this NV-parsing are compared with the results of the perceived parsings, referred to as PR-parsing. Consider in (37) two lines of Montale.

PR: Lo sai]: debbo riprenderil] e non posso].  

It know-2SG: must-1SG lose-you and not can-1SG  
'You know: I must leave you again and I can’t'

PR: Come un tiro [aggiustato] mi sommuove  

as a shot adjusted me excites  
'like a well-targeted shot [...] unsettles me'

NV-parsing and PR-parsing in both lines coincide insofar that the same syllables bear phrasal stress. The boldfaced vowels are the heads of these syllables. The square brackets in the NV-parsings mark off the edges of the phonological phrase domain. In the NV-parsing in (37b), the string enclosed by round brackets constitutes a potential restructured-φ domain. The perceived breaks in the PR-parsings are marked by square brackets: ']' stands for weak break, and ']' for strong break. In (37a), NVφ-edges and PR-edges (breaks) coincide. That is, in the same position as where NVφ-edges are assigned, the listeners perceived phonation breaks. Presumably, the strong breaks in the PR-parsings correspond not only to φ-edges but also to intonation phrase edges.

In chapter 3, the NV-φ parsings are compared with the PR-parsings assigned by the listeners to the recordings. Although the NV-φ parsing involves the grouping of the terminal elements of the syntactic tree into prosodic constituents, and the PR-parsing the grouping of perceived prominences, I assume that the phrasal stresses of the PR-parsing and the φ-heads of the NV-parsing refer to the same entity, i.e. to φ-stresses. This assumption is indirectly confirmed by Nespor & Vogel (1989), in which the heads of prosodic constituents receive a rhythmic interpretation in terms of metrical grid positions: the head syllable of the phonological phrase receives a mark at the grid level expressing phrasal stress.

In NV-parsed lines, the stressed syllable of the rightmost word in the φ domain, i.e. the head of the φ, is marked. In PR-parsed lines, by contrast, both main word stress and phrasal stress are marked. Regarding the lines in (37), the listeners perceived only phrasal stresses. In the PR-parsed lines in (38), however, there are words that are perceived as realized with main word stress, as indicated by the diacritic '·'.

---

39 See 2.1.1, for the definitions of these algorithms.
40 Being mainly interested in phonological phrase parsing, I shall refer only sporadically to correspondences between prosodic domains larger than the phonological phrase on the one hand, and perceived sentence stresses and strong breaks on the other.
(38) a. NV: [Abbandona]_{\text{p}} [la mazza]_{\text{p}} [fedele]_{\text{p}}, \quad \lambda=11
PR: Abbandonata la mázza fedele;

abandoned the staff faithful

'My faithful staff abandoned,'

b. NV: [Godì]_{\text{p}} [se il vento]_{\text{p}} [ch'entra]_{\text{p}} [nel pomario]_{\text{p}}, \quad \lambda=11
PR: Godì se il vento ch'entra nel pomario

rejoice-2SG-IMP if the wind that enters in-the orchard

'Rejoice when the breeze that enters the orchard'

In (38a), the word mázza is perceived as being realized with main word stress. NV-parsing, too, allows this word to be dependent on the following word fedele, because the two \( \varphi \) domains [la mázza] and [fedele] may undergo \( \varphi \)-restructuring. Thus, instead of ([la mázza]_{\text{p}} [fedele]_{\text{p}}), NV-parsing also allows for the output [la mázza fedele]_{\text{p}}. In (38b), by contrast, NV-parsing does not allow for the output [ch'entra nel pomario]_{\text{p}}, because [ch'entra]_{\text{p}} [nel pomario]_{\text{p}} does not fall within the scope of the \( \varphi \)-restructuring algorithm: the complement nel pomario is branching.

Appendix B lists the annotation conventions that are adopted in the two parsing modes, as well as the other symbols that are used in this thesis (see also the inserted bookmark).

2.4.3 Prosodic Parsing, Line Types and Line Grids

In chapter 3, the corpus of poetry is not only prosodically analyzed but also metrically. This metrical analysis consists of (a) a line typology which is based on the syllable-count criteria presented in table 2.2, and (b) metrical line grids representing strict binary alternation.

Regarding line types, for each type a statistical analysis is presented which specifies the number and percentages of NV-parsings and PR-parsings. To be more concrete, consider again the lines presented in (37) and (38). As indicated on the right of the NV-parsed lines, the examples constitute \( \lambda=11 \) lines. In (37), both lines contain three NV/PR phrasal stresses. That is, they constitute 3-\( \varphi \) lines. In (38a), by contrast, NV-parsing gives rise to 3-\( \varphi \), but PR-parsing to 2-\( \varphi \) lines; and in (38b), NV-parsing gives rise to 4-\( \varphi \), but PR-parsing to 3-\( \varphi \) lines. On the basis of this mini-corpus of \( \lambda=11 \) lines, it can be observed that 3-\( \varphi \) constitutes the most frequently occurring, or unmarked prosodic parsing of the \( \lambda=11 \). More marked are the 4-\( \varphi \) and 2-\( \varphi \) parsings. The exact proportions for all \( \lambda=11 \) lines and for all line types are presented in chapter 3 by means of line parsing tables. Regarding NV-parsing, it should be noted that non-restructured NV\( \varphi \)'s are counted. Thus, the line in (38a) is counted as a 3-\( \varphi \) NV-parsed \( \lambda=11 \). The reason for this is that the optionality clause, added by Nespor & Vogel to the algorithm, is not empirically defined. This disallows us to make unequivocal decisions to whether \( \varphi \)-restructuring takes place or not.
The unmarked prosodic parsings of $\lambda=11$ and $\lambda=7$ are confronted with the binary alternating metrical grid representation of these line types. In other words, the grouping of a line is compared with its regular recurrence of strong and weak beats. This leads to the metrical definition of the unmarked phonological phrase, which, in turn, is adopted to evaluate marked parsings.

The statistically determined generalizations concerning the phonological phrase are empirically verified on the basis of various diagnostics. These diagnostics come from all components of the grammar. Purely phonological diagnostics are enriched with morphological, syntactic, semantic and versificational diagnostics.

2.5 Conclusions

The method of research which is followed in order to provide a phrasal phonological analysis of the poetry of Montale and Ungaretti is based on the informational sources listed below:

\begin{enumerate}
\item a line typology of the poetry of Montale and Ungaretti based on the number of metrical positions per line
\item a statistical account of the prosodic parsings of the entire corpus into Nespor & Vogel's syntax-based algorithms of phonological phrase formation
\item a statistical account of the prosodic parsings of the recorded subcorpus as perceived by the listeners
\item an ideal binary alternating metrical grid representation for each line type
\item the determination of the unmarked shape of the phonological phrase
\item the determination of the unmarked prosodic pattern of a line type
\item phonological, morphological, syntactic, semantic and versificational diagnostics to prosodic phrasing.
\end{enumerate}